Title:

Burden and Risk Factors of Sexually Transmitted Diseases and Infections in Women of Reproductive Age (15–49 years) in Sub-Saharan Africa (SSA): A Scoping Review.

Submitted to:

Final Report of Summative Learning Project (SLP) presented to the BRAC James P Grant School of Public Health, BRAC University.

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Purpose:

In partial fulfillment of the Requirement for the Degree of Master of Public Health (MPH).

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ABSTRACT

Introduction

Sexually transmitted diseases and infections have a significant negative impact on both individual and community productivity across all countries, particularly in developing ones. Depending on the STI and the population, the risk of HIV acquisition and transmission may increase by two to eight times in low-income nations. Due to the consequences of co-infection with HPV and HIV, the prevalence of cervical diseases, including cervical cancer, has grown in Sub-Saharan Africa (SSA).

Method

This is a scoping evaluation of primary studies released between 2012 and 2022. We followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses expanded for scoping reviews in order to publish the findings of this inquiry (PRISMA.ScR). The original, peer-reviewed research publications that satisfied the inclusion requirements and were published from 2012 onward were given priority. These articles were collected from the databases of PubMed, EMBASE, and African Journals Online. Two impartial reviewers used preset criteria to conduct the screening.

Objective

This review was done to provide evidence on the burden and factors of sexually transmitted diseases and infections in women of reproductive age (15–49 years) in SSA.

Findings

Eleven (11) studies met the inclusion criteria. Ten (10) out of the eleven (11) included studies reported the prevalence of sexually transmitted diseases and infections in women of reproductive age in SSA. The risk factors were persistent with socio-cultural, behavioral, and socio-economic factors. The sociocultural factors identified include the age of the woman, marital status, employment, education of the woman, and, being in a female-headed home. The behavioral factors identified include having more than one sexual partner, and not using condoms with regular partners, and the socioeconomic factors identified include the environment of the woman respectively.

Conclusion

We come to the conclusion that age, being unmarried, living in urban areas, having sex with multiple sexual partners, low/primary education, and, self-employment/employment were factors associated with sexually transmitted diseases and infections in women of reproductive age in SSA. This review noted some gaps like (the mortality rate of STDS and STIs in SSA, the impact STDs, and STIs create on the reproductive health of the women, facilities available to test and treat women for STDs and , STIs etc.) which are required to be further researched in these areas.

Keywords: burden, factors, women of reproductive age/women in fertility age (WIFA), STIs, STDs, Sub-Saharan Africa.

INTRODUCTION

Background

Globally, one million people contract Sexually Transmitted Diseases and Infections every day. An estimated 374 million of one treatable STD and STI occurred Sub-Saharan Africa accounted for over 40% of the worldwide burden of STIs in 2021 (Michael et al., 2021). Only diarrheal, malaria and lower respiratory infections have a higher annual incidence than STDs and STIs which account for one of the most prevalent diseases in the world.

Sexual activity between individuals has the potential to spread sexually transmitted infections (STIs) and STDs (STIs). Anal, oral, and vaginal sex are frequently involved. However, they may occasionally spread by additional close physical contact. Skin-to-skin contact is a typical method for STDs like HPV and herpes to spread. Bacteria, viruses, and parasites can cause STDs or STIs (National Library of Medicine, 2021). Infertility, cervical cancer, pelvic inflammatory disease, and pregnancy problems can all be brought on by STIs, whether they are symptomatic or not. They are a significant contributor to morbidity in less developed countries (Michael et al., 2021). Human papillomavirus (HPV) infection is connected to more than 311 000 deaths from cervical cancer each year. The healthcare industry is heavily impacted financially and structurally by STIs (WHO, 2022).

STDs and STIs have a significant negative impact on both individual and community productivity across all countries, particularly in developing ones. Depending on the STI and the population, the risk of HIV acquisition and transmission may increase by two to eight times in low-income nations. The burden of cervical disorders, including cervical cancer, has increased in the SSA due to the effects of co-infection with HPV and HIV (Themba et al., 2017).

STDs and STIs, which directly affect sexual and reproductive health, can raise the risk of HIV. Drug resistance is a significant obstacle to global attempts to reduce the prevalence of STIs (WHO, 2022). In SSA such as Ghana, Liberia, Guinea, Sierra Leone, Mali Ethiopia, Botswana, and Guinea, most individuals especially women living with STIs and STDs are not aware of their condition, and some report late due to a lack of access and affordability of healthcare services (WHO 2022).

The gap in the Literature

In a preliminary search, we realized that there are many gaps in the studies that have been carried out in the aspect of STIs and STDs in SSA. We found that studies do not emphasize STIs and STDs in WIFA in SSA, and most only emphasized some STDs and STIs, and not all are well covered. Also, most studies

only gave definitions and prevalence of STDs/STIs but how the outcome and consequences affect people's life is not well described (Michael et al., 2010; Nyaradzai et al., 2010; Veronicah et al., 2021) and more.

Justification

The research on STDs and STIs in women of reproductive age in SSA is lacking in some areas. In light of this, we carried out a scoping review. This review highlighted prior research on the prevalence and contributing factors of STDs and STIs, identified study gaps, and provided an overview of the information that is currently available about STDs and STIs in WIFA in SSA. As a result, this scoping review maps out the information on the burden and risk of STDs and STIs among women of reproductive age in SSA. The outcome might also have an impact on how national politicians design targeted measures to deal with these issues.

Conceptual Framework

Figure1 contains the conceptual framework for this study. It demonstrates how socio-cultural, behavioral, economic, and health influence the burden and risk factors of STIs and STDs in women of reproductive in SSA.

Figure 1: Conceptual Framework

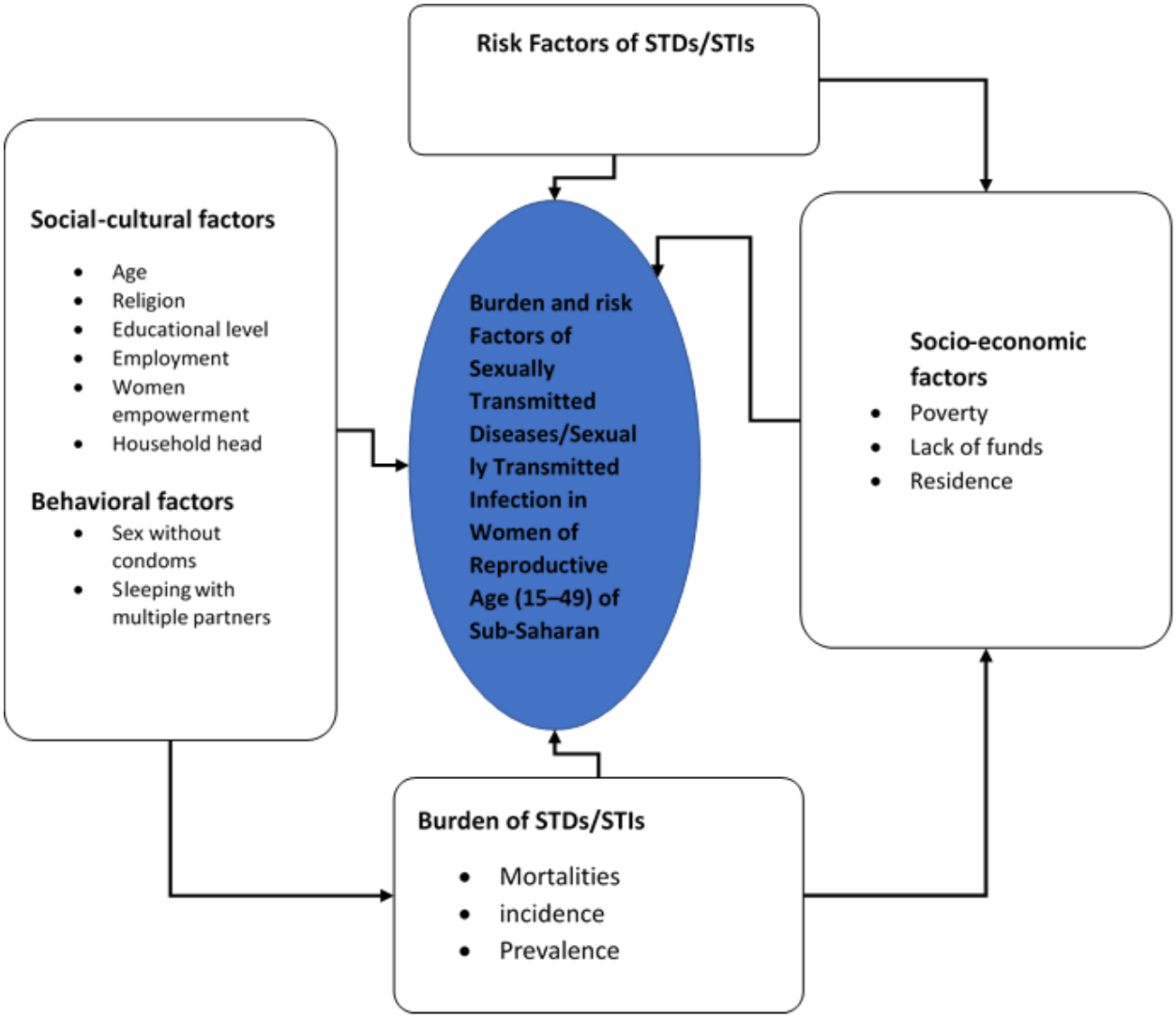


Figure source: Author, 2022

Operational definitions

Table 2 outlines the operational definitions that will be used for this scoping review.

Research Question

This study's research question was: "What is the available evidence on the burden and factors of sexually transmitted diseases and infections in women of reproductive age (15–49 years) in SSA?"

Objectives

General objectives

To provide an overview of evidence on the burden of sexually transmitted diseases and infections sexually transmitted infections in Women of Reproductive Age/women in fertility age (WIFA) (15–49 years) in SSA.

Specific objectives

1. To provide an overview of evidence on the burden of sexually transmitted diseases and infections in women of reproductive age (15–49 years) in SSA.

2. To explore the risk factors for sexually transmitted diseases and infections in women of reproductive age (15–49 years) SSA.

METHODOLOGY

Study Design

This is a scoping evaluation of primary studies released between 2012 and 2022. We followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses expanded for scoping reviews in order to publish the findings of this inquiry (PRISMA.ScR) (Tricco, et al., 2018). The original, peer-reviewed research publications that satisfied the inclusion requirements and were published from 2012 onward were given priority. These articles were collected from the databases of PubMed, EMBASE, and African Journals Online. Two impartial reviewers used preset criteria to conduct the screening.

Study Identification

Inclusion criteria

The review included only:

1. Peer-reviewed primary studies published between 2012–2022 on STIs/STD burden and factors among women of reproductive age in SSA.
2. Studies published within the last ten years (2012-2022)
3. Studies that included both quantitative and qualitative studies published.
4. Studies published in English whose population were women of reproductive age in SSA countries.
5. The studies that identified from three main databases, namely; PubMed, EMBASE, and African Journals Online.

Exclusion criteria

The review excluded:

1. Peer-reviewed papers that were not from SSA countries.
2. Conditions other than STDs/STIs.
3. STDs/STIs reported in other populations (e.g. males, other genders, and the population outside the defined age group (15-49 years).
4. Studies not published in English.

Search Strategy

Three databases (PubMed, EMBASE, and African Journals Online) were systematically searched to retrieve relevant articles. Table 1 presents key terms for the literature search. We combined keywords

using Boolean operators: ‘OR’ and ‘AND’. In combining synonyms, the ‘OR’ operator was used between the terms whiles the ‘AND’ operator was used to combine different terms. For example, one search strategy was: ‘Sexually transmitted infections’ OR ‘Sexually Transmitted Diseases’ AND ‘Sub-Saharan Africa’ OR ‘Africa’ OR ‘Sub-Saharan Africa’ AND; Burden’ AND ‘prevalence’ AND ‘incidence’ AND ‘mortality’. After that, we conducted a search utilizing all of the identified Medical Subject Headings (MeSH) phrases to make sure that all pertinent studies were included. African journals online, PubMed, and EMBASE were all searched for information. A snowballing strategy was used to find additional articles by going through the reference lists of selected articles to identify seemingly relevant articles. These identified articles were screened but none met the inclusion criteria. Once the identification of articles was done, duplicates and irrelevant articles were eliminated after titles and abstracts were screened.

Eligibility Criteria

The review included only peer-reviewed primary studies published between 2012–2022 on STIs and STDs burden and factors in women in reproductive age in SSA. Studies published within the last ten years was selected to allow the reviewer a chance to include the different Sexual Reproductive Health research priority areas before and after the implementation of the Sustainable Development Goals. This included both quantitative and qualitative studies published in English whose population were women in reproductive age in SSA countries. The studies were identified from three main databases, namely; PubMed, EMBASE, and African Journals Online. Using the population concept context (PCC) framework, which is shown in Table 1, the eligibility requirements for possible articles to meet the research topic were established.

Study Selection

A common systematic review system/database called Rayyan received the results of the databases that were searched and was used to organize them. Two separate reviewers independently went through the titles and abstracts of all publications and applied the inclusion and exclusion criteria after an independent reviewer first carried out the title screening and duplicates removal. By speaking with the primary reviewer, all disagreements between them were settled. Following the initial screening, the full texts of every article were retrieved and uploaded to the program. Similar to the first screening, the second screening involved two reviewers reading the entire articles, and once more, disagreements were settled through talks. The purpose of this screening was to determine whether the chosen articles complied with the inclusion standards that were compiled for the final review.

Data Charting and Extraction

To aid in selecting the appropriate variables to be extracted in order to respond to the study's research question, a data charting form was created. The first author's last name, the year of publication, and the prevalence/incidence, mortality, and risk factors of STIs/STDs in WIFA were used to extract data from the included studies. The data extraction tool included details on the authors, the year the study was published, the study's purpose, its design, its area of investigation (the country), its population, its sample size (n), its aims, and its most important findings.

Data Analysis

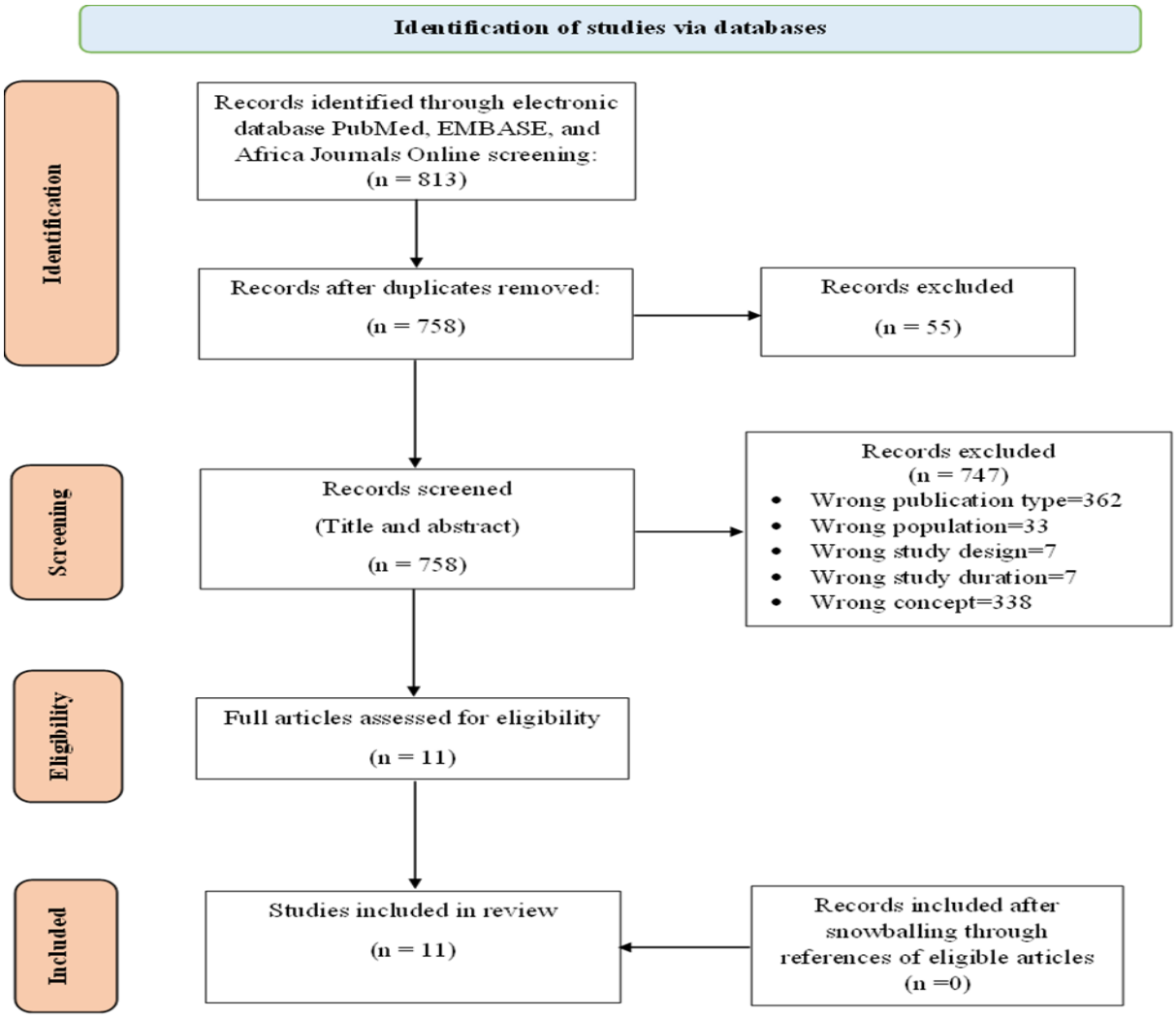
The results of the scoping review will be analyzed thematically under broader themes in tabular form with separate tables for findings on the prevalence/incidence, mortality, and risk factors. The kind of literature available, study types and nature will be included. Factors of STIs and STDs in women in reproductive age in SSA will be determined by statistical estimates of inferential analyses with p-value less than 0.05 at 95% confidence interval. Consequently, a variable will be considered and captured as factor of STIs and STDs if the study reported it as having $p<0.05$. Key findings will be summarized from each table identifying both the commonalities and differences. The final report will include a thematic overview of the findings in a summarized way indicating the recent situation and the gaps in the respective issue in the alignment of the study objectives.

FINDINGS

Search Results

The PRISMA flow diagram in figure 2 illustrates how articles are screened, included, and excluded. We eliminated n=55 of the n=813 items from the initial search due to duplication and title inconsistencies. Eleven papers were left after n=758 total studies were evaluated for full-text eligibility and n=747 of those were further excluded for not meeting our inclusion standards.

Figure 2: PRISMA flow diagram



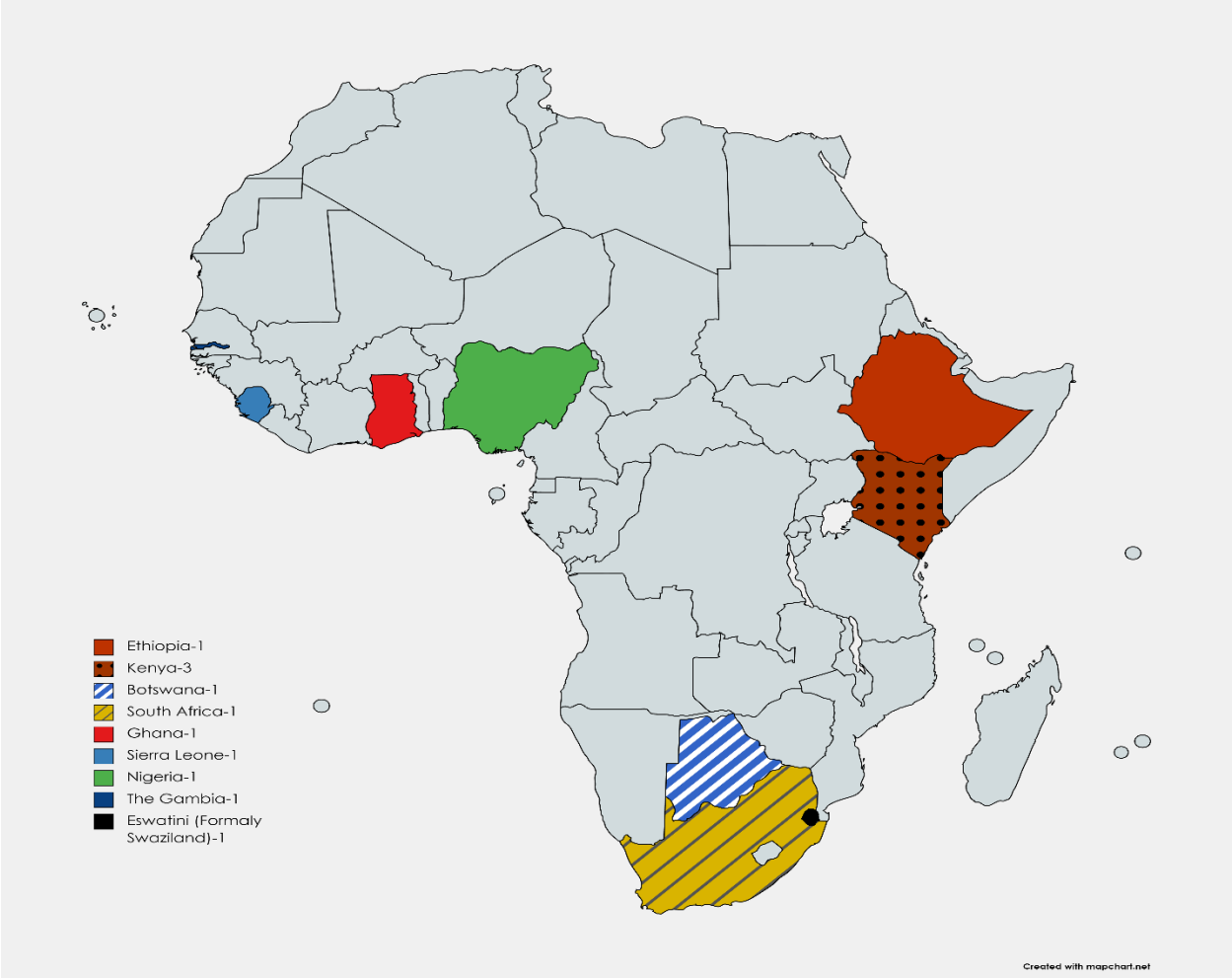
Characteristics of the Included Studies

All 11 studies retained in the final review were quantitative studies, consisting of cross-sectional (n=8), prospective cohorts (n=2), and retrospective cohort (n=1). The studies were carried out in Kenya (n=3), Swaziland (n=1), The Gambia (n=1), Ghana (n=1), Botswana (n=1), Nigeria (n=1), South Africa (n=1), Ethiopia (n=1), and Sierra Leone (n=1). Ten out of the 11 studies used questionnaires and at least one laboratory test/screening. All the studies used at least one laboratory tests/screening. While seven of the studies used vulvovaginal swab (Ginindza et al., 2017; Isara & Baldeh, 2021; Zenebe et al., 2021 ; Nyemba et al., 2021; Yirenya-Tawiah et al., 2014; Wynn, et al., 2018; Kohli et al., 2013), two used urine (Isara & Baldeh., 2021; Masese 2017), two used blood tests (Isara & Baldeh, 2021; Umoke, et al., 2021), one used wet-mount microscopy (Maina et al., 2016), one used socio-demographic data (Kawuki et al., 2022). This is shown on table 4.

Table 4: Characteristics of included articles

Author, year	Country	Study design	Population	Sample size	Tools	Aim
Ginindza T.G et all., 2017	Swaziland	Cross-sectional	Women aged 15–49	655	Cervical specimens were tested	● To determine the prevalence and risk factors associated with STIs
Isara & Baldeh., 2021	The Gambia	cross-sectional	Pregnant women aged 15-44 years	280	Blood, urine, and high vaginal swabs samples, questionnaire and specimen analysis	● To determine the prevalence of STIs among pregnant women attending antenatal care (ANC) clinics
Maina A.N., et al, 2016	Kenya	cross-sectional	Women aged 18-49	261	An interviewer-administered questionnaire and wet-mount microscopy	To determine Knowledge of the prevalence of curable STIs

Zenebe M.H et al., 2021	Ethiopia	cross-sectional	Pregnant women aged 17-41 years	350	Structured questionnaire and vaginal swab	Prevalence of STIs and associated risk factors were assessed
Nyemba, D. C., et all, 2021	South Africa	Prospective observational studies	Pregnant women ≥18 years	669	Questionnaire and vulvovaginal swab specimens	Evaluated the prevalence and incidence of STIs in pregnant women and the associated risk factors.
Yirenya-Tawiah, D., et all 2014	Ghana	Cross-sectional stud	Women aged 15–49 years	191	A structured questionnaire	To assess the prevalence of both Chlamydia trachomatis(CT) and Neisseria gonorrhea (NG) infections
Wynn, A., et all, 2018	Botswana	Prospective study	Pregnant women aged 18 years and above	400	Self-collected vaginal swabs	Determined the prevalence of infections, uptake of treatment and proportion cured.
Umoke M., 2021	Nigeria	Retrospective study	Pregnant women	4657		Determined the prevalence, co-infection, and risk factors associated with HBV, HCV, HIV, and Syphilis infections
Masese, L. N., 2017	Kenya	Cross-sectional study	15- to 24-year-old women	463 high school and 165university students c	Self-administered questionnaire and urine specimen	assessed feasibility and acceptability of STI screening
Kohli, R., 2013	Kenya	cross-sectional study	women of reproductive age	300	Questionnaire and vaginal swabs	Define the prevalence of genital Chlamydia infection
Kawuki, J., 2022	Sierra Leone.	Cross-sectional survey	Women of reproductive age-15–49years	12,005	Sierra Leone Demographic and Health Surveys (SLDHS)	Determine the prevalence of HIV risk factors and their associated socio-demographics among



Prevalence of Sexually Transmitted Infections and Diseases in women of reproductive age in Sub-Saharan Africa

Table 5 indicated that 10 out of 11 included studies reported the prevalence of sexually transmitted infection/sexually transmitted disease in WIFA in sub-Saharan Africa. Eight papers reported on C. trachomatis with a prevalence ranged from 0.7% in Kenya (Masese et al., 2017) to 13% in Kenya (Maina et al., 2016), six papers reported on T. vaginalis with a prevalence ranged from 0.4% in Kenya (Maina et al., 2016) to 8.4% in Nigeria (Ginindza et al., 2017), six papers reported on N. gonorrhea with a prevalence ranged from 1.3% in Botswana (Wynn et al., 2018) to 6.0% in Nigeria (Ginindza, et al., 2017), three studies reported on HIV with a prevalence ranged from 0.9% in Nigeria (Umoke et al., 2021) to 42.7% in Swaziland (Ginindza et al., 2017) two paper reported on syphilis with a prevalence of 1.4% in Swaziland (Ginindza et al., 2017) and 1.8% in Nigeria (Umoke et al., 2021), one paper reported on HBV

and HCV with a prevalence of 4.1% in Nigeria (Umoke et al., 2021), one paper reported on genital warts with a prevalence of 2.0% in Swaziland (Ginindza et al., 2017) , one paper reported on Candida albicans with a prevalence of 31.8% in Gambia ((Isara & Baldeh., 2021), one paper reported on Streptococcus agalactiae with a prevalence of 15% in Gambia ((Isara & Baldeh., 2021) and one paper reported on Treponema pallidum with a prevalence of 3.9% in Gambia (Isara & Baldeh., 2021) respectively.

Factors associated with sexually transmitted infection and disease in women of reproductive age in sub-Saharan Africa

Of the eleven studies included, only four showed associated factors as displayed on table 6. Different associated factors were identified. These factors were persistent with socio-cultural, behavioral, and economic factors. The socio-cultural factors identified includes: the age of the woman, marital status, employment, education of the woman, and being in a female-headed home, (Zenebe et al., 2021, Kawuki et al., 2022; Ginindza et al., 2017; Masese et al., 2017). The behavioral factors identified includes: having more than one sexual partner, and not using condoms with regular partners (Zenebe et al., 2021; Kawuki et al, 2022), Ginindza et al., 2017; Masese et al., 2017). The socioeconomic factors identified includes: the environment of the woman, (Kawuki et al., 2022).

In relation to age as a significant factor of STDs and STIs in women of reproductive in SSA, studies reported that younger women were at higher risk of having curable and non-curable STDs and STIs compared to elders (Zenebe et al., 2021; Kawuki et al, 2022).

Concerning marital status, studies reported that unmarried women were at higher risk of curable and noncurable STIs compared to married women (Zenebe et al., 2021, Kawuki, et al., 2022).

Being a self-employed woman was associated with a higher risk of STDs and STIs when compared to unemployed women (Zenebe et al., 2021; Kawuki et al., 2022).

Having more than one sexual partner in a lifetime was associated with an increased risk for STIs, and engaging in receptive sex without a condom remained significantly associated with STIs (Masese et al., 2017; Ginindza et al., 2017).

We found that living in urban areas was identified as one of the factors associated with STIs/STDs in WIFA in SSA. Also, women from female-headed households were likely to be infected with HIV as compared to those living in a male headed household according to a study in Sierra Leone (Kawuki, et al., 2022).

Discussion

This scoping review's objective was to map the body of knowledge concerning the prevalence and risk factors of STDs and diseases associated with STDs among reproductive-aged women in sub-Saharan Africa. This review shows that sexually transmitted illnesses and infections are substantially more common among sub-Saharan African WIFA. This review also criticized some of the primary causes of STI and STD in WIFA in SSA. According to certain research considered, age, marital status, employment, residence, level of education, and the woman's position as head of family are among the major variables connected to STIs and STDs.

Five of the included studies reported factors of STIs and STDs in women of child bearing age in sub-Saharan Africa (Zenebe et al., 2021., Kawuki, et al, 2022., Ginindza, et al., 2017., Masese, et al., 2017; Nyemba, et al, 2021). Age (Zenebe et al., 2021., Kawuki, et al, 2022., Ginindza, et al., 2017., & Nyemba, et al, 2021), being unmarried (Zenebe et al., 2021., Kawuki, et al, 2022., Ginindza, et al., 2017., & Nyemba, et al, 2021) , self-employed/being employed (Zenebe et al., 2021 & Ginindza, et al., 2017), having multiple sexual partners (Zenebe et al., 2021., & Masese, et al., 2017), condom less sex (Masese, et al., 2017 & Ginindza, et al., 2017), living in urban area (Kawuki, et al, 2022), low level of education (Zenebe et al., 2021) and living in a female headed household (Kawuki, et al, 2022) were identified as the major factors.

We found that age was a significant factor of STIs in women of child bearing in SSA, four studies reported that younger women (15-34 years) were at high risk of being infected with curable and non-curable STIs compared to elders. This is comparable to study a conducted in Brazil (Silveira et al.,2020) which reported that younger women are at higher risk of having STIs. The possible reason might be because younger women are sexually active and seem to be more engaged in risky sexual behaviors than older women.

Studies reported that self-employed/employed woman was a high risk for STIs compared to unemployed women. This is similar to a study conducted in South East Asia women (Feng et al., 2018) which reported that, economic pressure and financial needs as distracting women from engaging in preventive behaviors such as using condoms if there is financial gain.

We found that having multiple sexual partners were associated with an increased risk for STIs. This is similar to a study conducted in Asia and Pacific Islander young adults (Hahm, et al, 2007) which concluded that, high STI risk is associated to having sex with multiple partners without protection. It is conclusive with another similar study conducted in Nepal (Shakya et al., 2018). This might be because

most sexual partners might refuse the use of condoms. And if the woman is doing it for financial favors, she might little or no options but to go along with no condom.

Our study found that condom less sex was significantly risk of STIs. This finding is similar to a study conducted Iran which concluded that, appropriate condom use can reduce the risk of STIs than being involved in condom less sex which can be an increased risk factor of having STIs (Nasirian et al., 2017). The reason might be because condom use is not favored by many sexual partners.

Last but not least, our research showed that WIFA in Sub-Saharan Africa who are unmarried, those with low/primary level of education, and those in a female-headed home, self-employment and those living in urban areas had a higher likelihood of reporting having STIs than other groups. These results are consistent with mapping studies carried out in Indonesia and Bangladesh (Rudi, et al, 2020, Huda et al., 2020), who those with low/primary level of education, those in a female-headed home, self-employed and those living in urban areas have a higher likelihood of reporting having STIs than their counterparts who have higher education, married, live in rural areas. The possible reason might be that, unmarried women have the tendencies of having multiple or different sexual partner and do not use condoms, women who living in urban areas engage in more risky sexual behaviors and abuse substance than those in rural areas and rape sometimes very common in urban areas which result to STIs. Also, love level of education might be due to lack sexual and health education and those in female headed homes might not be getting the adequate care and guidance needed to use adequate precautions to prevent themselves from rape and substance abuse.

Implication for policy and public health

The results of this study have implications for both public health and policy. In order to create the necessary precautions, preventive methods, treatments, and policies to stop its continuing rise, it is crucial to consider the factors associated with STIs and STDs in WIFA in sub-Saharan Africa as identified in this study. Age was the most significant factor of STIs among those factors found to be associated with STIs in WIFA in sub-Saharan Africa, while condom-less sex having multiple sexual partners and marital status was found to be a common factor of STIs and STDs, and this demands the attention of decision-makers, governmental bodies, non-governmental organizations, and other significant parties involved in the creation and implementation of policies to create and implement social and behavioral policies that will be directed at the prevention of sexually transmitted diseases/sexually transmitted infections among WIFA in sub-Saharan Africa in order to lessen or eradicate harmful effects on sexual and reproductive health.

The results of this study also revealed residencies (living in urban area), self-employed/employed and other health behavioral characteristics as factors of STIs and STDs unfavorable sexual outcomes, which has significance for public health. As a result, public health professionals will have the framework for their programs and initiatives. Additionally, it will support the best possible use of limited resources to lower negative outcomes of STIs and STDs in WIFA in sub-Saharan Africa.

Implication for Research

According to these research findings, age, being unmarried, low education level, living in an urban area, and not using condoms during sex are the major risk factors of STIs/STDs for women of reproductive in sub-Saharan Africa. Future studies should consider conducting primary research that will help policymakers and stakeholders understand the extent to which these factors affect young women's sexual and reproductive health rights in SSA at both the household and community level since it is unknown how much they affect WIFA in SSA at both the household and community levels.

Strengths and Limitations

We were able to identify gaps in the literature that might be helpful for future research and policy implications due to the study methodology. No study, however, is without constraints. For instance, no study was found on the mortality of STIs/STDs, and most studies focused on only one country or one STI. No study was found on qualitative approach to help with the in-depth information about that factors. Additionally, fewer studies were found for this review. Despite these drawbacks, this evaluation offered data that would help direct future research aimed at eradicating or lowering the burden and factors of sexually transmitted infections/sexually transmitted diseases in Sub-Saharan Africa.

Conclusion and Recommendation

The burden and contributing factors of sexually transmitted infections and sexually transmitted infections in Sub-Saharan Africa are discussed in this paper, and gaps in the literature have been discovered and supported. We draw the conclusion that factors contributing to sexually transmitted infections and diseases among WIFA in sub-Saharan Africa were age, marital status, place of residence, many sexual partners, lower educational level, and being self-employed or employed. The findings of this study demand that significant parties, including Ministries of Health, organizations that provide health services in various sub-Saharan African regions, and organizations that provide sexual and reproductive health services, pay close attention to the formulation of policies and the development of behavioral and social interventions, such as increasing access to service by introducing community screening services, routine

free screening for some selected STIs. This review also suggested that additional study be done on other STIs such the herpes simplex virus (HSV), which has not been investigated, particularly in the majority of SSA nations.

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Annexes

Table 1: Key terms as per PCC

PCC Terms	Serial Number	Key terms	Synonyms
Population	1	Women of reproductive age	Women of reproductive age Women of childbearing age Women in fertility age Women of fertility age Women between the age groups 15 to 49 years
Concept	2	Sexually transmitted diseases	Sexually transmitted infections or sexually transmitted diseases or specific STIs/ STDs
		Factors	Risk factors or specific factors Predictors OR specific predictors Determinants OR specific determinants
		Burden	Prevalence OR common occurrence Incidence or rate Mortality or death
Context	3	Sub-Saharan Africa	Sub-Saharan Africa or all the countries in SSA Africa
P+C+C	4		#1 AND #2 AND #3

Table 2: Operational definitions

Key terms	Operational Definition
Sub-Saharan African Regions (SSAR)	These are low- and middle-income countries part of the African continent situated geographically south of the Sahara. There are 48 countries in sub-Saharan Africa (SSA) (World Bank, 2022).
Women of Reproductive age/Women in fertility age	All women of reproductive age from 15-49 years.
STIs/STDs	Infections or diseases transmitted through sexual activities.
The burden of STIs/STDs	This refers to the STIs/STD Prevalence, Incidence, and Mortalities as well as the health and social impacts of STIs/STDs.
Factors of STIs/STDs	These are behavioral, social, economic, cultural, and health system-related factors that influence the transmission of STIs/STDs.

Table 3: Overview of the document review protocol

Research Questions	What is the evidence of the Burden and Factors of Sexually Transmitted Diseases and Infections in Women of Reproductive Age/women of fertility age (15–49 years) in SSA?
General Objective	To provide the evidence of the Burden and factors of Sexually Transmitted Diseases in Women of Reproductive Age/women of fertility ag (15–49 years) in SSA.
Specific Objectives	To provide an overview of evidence of the Burden of Sexually Transmitted Diseases and infections in Women of Reproductive Age (15–49 years) in SSA.

	To explore the factors of Sexually Transmitted Diseases and infections in Women of Reproductive Age (15–49 years) SSA.
Research Strategy	
Inclusion Criteria	The review will include only peer-reviewed primary studies published between 2012–2022 on STIs/STDs burden and Risk Factors, in SSA. This will include both quantitative and qualitative studies published in English whose population were women of reproductive age in SSA countries (Annex 2).
Exclusion Criteria	The review will exclude peer-reviewed papers that are not from SSA countries. Conditions other than STDs/STIs will also be excluded. Also, STDs/STIs were reported in other populations (e.g. Males, other genders, and the population outside the defined age group (15-49 years) will not be considered.
Time Frame	Article from 2012 to 2022
Data Sources	Indexed Articles from PubMed, EMBASE, and African Journals Online

Author, year	Country	Study design	Population	Sample size	Tools	Aim
Ginindza T.G et all., 2017	Swaziland	Cross-sectional	Women aged 15–49	655	Cervical specimens were tested	● To determine the prevalence and risk factors associated with STIs
Isara & Baldeh., 2021	The Gambia	cross-sectional	Pregnant women aged 15-44 years	280	Blood, urine, and high vaginal swabs samples, questionnaire and specimen analysis	● To determine the prevalence of STIs among pregnant women attending antenatal care (ANC) clinics
Maina A.N., et al, 2016	Kenya	cross-sectional	Women aged 18-49	261	An interviewer-administered questionnaire and wet-mount microscopy	To determine Knowledge of the prevalence of curable STIs
Zenebe M.H et al., 2021	Ethiopia	cross-sectional	Pregnant women aged 17-41 years	350	Structured questionnaire and vaginal swab	Prevalence of STIs and associated risk factors were assessed
Nyemba, D. C., et all, 2021	South Africa	Prospective observational studies	Pregnant women ≥18 years	669	Questionnaire and vulvovaginal swab specimens	Evaluated the prevalence and incidence of STIs in pregnant women and the associated risk factors.

Yirenya-Tawiah, D., et all 2014	Ghana	Cross-sectional stud	Women aged 15–49 years	191	A structured questionnaire	To assess the prevalence of both Chlamydia trachomatis(CT) and Neisseria gonorrhea (NG) infections
Wynn, A., et all, 2018	Botswana	Prospective study	Pregnant women aged 18 years and above	400	Self-collected vaginal swabs	Determined the prevalence of infections, uptake of treatment and proportion cured.
Umoke M., 2021	Nigeria	Retrospective study	Pregnant women	4657		Determined the prevalence, co-infection, and risk factors associated with HBV, HCV, HIV, and Syphilis infections
Masese, L. N., 2017	Kenya	Cross-sectional study	15- to 24-year-old women	463 high school and 165university students c	Self-administered questionnaire and urine specimen	assessed feasibility and acceptability of STI screening
Kohli, R., 2013	Kenya	cross-sectional study	women of reproductive age	300	Questionnaire and vaginal swabs	Define the prevalence of genital Chlamydia infection
Kawuki, J., 2022	Sierra Leone.	Cross-sectional survey	Women of reproductive age-15–49years	12,005	Sierra Leone Demographic and Health Surveys (SLDHS)	Determine the prevalence of HIV risk factors and their associated socio-demographics among

Table 5: The burden of STIs/STDs among Women of Reproductive Age in SSA: Prevalence and Incidence.

Author, year	**Country/ Setting**	**Study design**	**Population**	**Sample**	**Tools**	**Results/ Key Findings**
Ginindza T.G., et all, 2017	Swaziland	Cross-sectional	Women aged 15–49	655	Cervical specimens were tested	• The overall weighted prevalence of any of these five STIs was 19.4% (95% CI: 14.9–24.8) • The estimated prevalence was 7.0% (95% CI: 4.1–11.2) for CT, 6.0% (95% CI: 3.8–8.8) for NG, 8.4% (95% CI: 5.4–12.8) for TV, 1.4% (95% CI: 1.1–10.2) for syphilis and 2.0% (95% CI: 1.0–11.4) for genital warts.
Alphonsus Isara & Aru-Kumba Baldeh., 2021	The Gambia	cross-sectional	Pregnant women aged 15-44 years	280	Blood, urine, and high vaginal swabs samples, questionnaire and specime	• The overall prevalence of STIs was 53.6%. • The most prevalent pathogenic agent isolated was Candida albicans 89 (31.8%) followed by Streptococcus agalactiae 42 (15.0%), Treponema pallidum 19 (6.8%), HIV 16 (5.7%), Trichomonas vaginalis 11 (3.9%), Neisseria gonorrhea 5

					n analysis	(1.8%), and the least prevalent was Chlamydia trachomatis 2(0.7%) ● STIs were more prevalent among women in the younger age group of 15 – 24 years (54.7%), unemployed (54.0%), Primipara (62.3%), and in the third trimester of pregnancy (72.7%).
Maina A.N., et al, 2016	Kenya	cross-sectional	Women aged 18-49	261	An interviewer-administered questionnaire and wet-mount microscopy	● The prevalence of CT was 13% (33/249), TV 0.4% (1/249), and GC 0% (0/249)
Zenebe M.H et al., 2021	Ethiopia	cross-sectional	Pregnant women aged 17-41 years	350	Structured questionnaire and vaginal swab	● STIs were detected in 14.6% (51/350) (95% CI: 10.9–18.3) of the 350 women. ● The prevalence was 8.3% (29/350) (95% CI: 5.1–11.1) for C. trachomatis, 4.3% (15/350) (95% CI:

						2.3–6.9) for N. gonorrhoeae, and 3.1% (11/350) (95% CI: 1.4–4.9) for T. vaginalis
Nyemba, D. C., et all, 2021	South Africa	Prospective observational studies	Pregnant women ≥18 years	669	Questionnaire and vulvovaginal swab specimens	• At baseline, 37% (n=250) of pregnant women in our study were diagnosed with at least one STI (95% CI, 33% to 41%; n=250) • At enrolment, 37% (n=250) were diagnosed with at least one STI, of which 76% (n=190) were asymptomatic. • STI prevalence was 40% (n=213) in WLHIV and 27% (n=37) in women without HIV (p=0.01). • The incidence rate of STI during pregnancy and early post-partum was 15 infections per 100 women years (95%CI 9 to 23).
Yirenya-Tawiah, D., et all 2014	Ghana	Cross-sectional stud	Women aged 15–49 years	191	A structured questionnaire	• The overall prevalence of CT and NG were 6.3% and 2.6% respectively. • The highest prevalence rates of CT were in the 15 to 19-year group while only individuals

						between 15 and 39 years were positive for NG. .
Wynn, A., et all, 2018	Botswana	Prospective study	Pregnant women aged 18 years and above	400	Self-collected vaginal swabs	● Fifty-four (13.5%) tested positive for CT, NG and/or TV: 31 (8%) for CT, 5 (1.3%) for NG and 21 (5%) for TV. ● The prevalence of CT, NG and/or TV was high, particularly among women with HIV infection.
Umoke, M., 2021	Nigeria	Retrospective study	Pregnant women	4657		● The findings indicated a medium prevalence of HBV (4.1%), a high prevalence of HCV (4.1%) and syphilis (1.8%), and a low prevalence of HIV (0.9%).
Masese, L. N., 2017	Kenya	Cross-sectional study	15- to 24-year-old women	463 high school and 165university students c	Self-administered questionnaire and urine specimen	● Twenty-six students (5.8%; 95% CI, 3.6%–7.9%) were diagnosed with STIs (7 [1.6%] with N. gonorrhea, 16 [3.6%] with C. trachomatis, and 3 [0.7%] with T. vaginalis).

						• The prevalence of STIs was 19(12.7%) of 150 in those who reported receptive vaginal sex versus 7 (2.3%) of 301 in those who did not (OR 6.09; 95% CI2.50–14.00,P= <0.001).
Kohli, R., 2013	Kenya	cross-sectional study	women of reproductive age	300	Questionnaire and vaginal swabs	• The prevalence of genital Chlamydia trachomatis was found to be 6% (95% CI3.31%–8.69%). • The prevalence was higher in women who represented a higher socioeconomic level, but this difference was not significant (p=0.061).

Table 6: factors for STIs and STDs in women in reproductive age

Author, year	Country	Study design	Population	Sample	Tools	Results/ Key Findings
Ginindza T.G., et all, 2017	Swaziland	Cross-sectional	Women aged 15–49	655	Cervical specimens were tested	• Risk factors associated with STIs were being employed (OR = 2.2, 95% CI: 1.0–4.7), self-employed (OR = 2.8, 95% CI: 1.5–5.5) and being hr-HPV positive (OR = 2.0, 95% CI: 1.3–3.1).

						• Age (0.9, 95% CI: 0.8–0.9), being married (OR = 0.4, 95% CI: 0.3–0.7) and not using condoms with regular partners (OR = 0.5, 95% CI: 0.3–0.9) were inversely associated with STIs.
Zenebe M.H et al., 2021	Ethiopia	Cross-sectional	Pregnant women aged 17-41 years	350	Structured questionnaire and vaginal swab	• Multivariable logistic regression analysis indicates, younger women (<25 years) were at higher risk of having curable STI compared to elders (AOR, 2.7; 95% CI 1.1–6.6; p = 0.031). • The other independent predictors associated with curable STIs were unmarried women (AOR, 3.4; 95% CI: 1.1–10.4; p = 0.028) compared to married women, self-employed women compared to un-employed (AOR, 7.6; 95%CI: 1.7–34.7; p = 0.009), underweight (AOR, 5.9; 95% CI: 1.8–19.1; p < 0.003) compared to normal birth weight, women reporting

						the presence of vaginal discharge (AOR, 8.3; 95% CI: 3.4–20.5; p < 0.001) compared to no vaginal discharge. ● Having more than one sexual partner and an educational level of only junior or primary were identified as potential predictors of curable STIs in the bivariable analysis but not the multivariable analysis.
Nyemba, D. C., et all, 2021	South Africa	Prospective observational studies	Pregnant women ≥18 years	669	Questionnaire and vulvovaginal swab specimens	● STI infection was associated with younger age (OR=0.95 per year, 95% CI 0.92 to 0.98). ● In adjusted analyses, STI infection was associated with higher gestational age at the first ANC visit (adjusted OR (aOR)=1.03 per week, 95% CI 1.00 to 1.05) and non-marital/cohabitating relationship (aOR=1.53, 95% CI 1.09 to 2.15).
Kawuki, J., 2022	Sierra Leone.	Cross-sectional survey	Women of reproducti	12,005		● Women of 15 to 19 years (AOR=1.34, 95%

			ve age-15–49 years			CI 1.00–1.80) and those of 20 to 34 years (AOR=1.25, 95% CI 1.05–1.49) were respectively, 34% and 25% more likely to have HIV risk factors compared to those of 35 to 49 years of age. ● Urban residents were 49% more likely to encounter HIV risk factors (AOR=1.49, 95% CI 1.17–1.89). ● Compared to women in the Western region, those from the South were 33% less likely (AOR=0.67, 95% CI 0.50–0.90) while those in the Northwest were 81% more likely (AOR=1.81, 95% CI 1.26–2.60) to have HIV risk factors. ● Moreover, women from female-headed households (AOR=1.22, 95% CI 1.03–1.44), and those working (AOR=1.38, 95% CI 1.14–1.67) were 22% and 38% respectively, more likely to have HIV risk

						factors, compared to their respective counterparts. ● Marital status was strongly associated with HIV risk factors; whereby unmarried women were over 111% (AOR=111.17, 95% CI 87.55–141.18) more likely to have HIV risk factors. ● In addition, women with parity of 0–1 (AOR=1.32, 95% CI 1.01–1.72) and 2–4 (AOR=1.26, 95% CI 1.01–1.57) were 32% and 26% more likely to have HIV risk factors, respectively.

Annex 1: Key Terms Used for Electronic Database Search

Search date	December 22, 2020
Limits	Date range: 2012 – 2022 Language: English Sort by: relevance Entry term location: anywhere in the article
Search query	(((burden) AND (sexually transmitted infections)) AND (women of reproductive age)) AND (women of Sub-Saharan Africa) (((Prevalence) AND (sexually transmitted infections)) AND (women of reproductive age)) AND (women of sub-Saharan Africa)

	(((Risk factors) AND (sexually transmitted infections)) AND (women of reproductive age)) AND (women of sub-Saharan Africa)
Number of hits	753
Notes	Screen the first 100 hits (considering the time required to screen each hit and its relevancy) from each search

Annex 2: Title and abstract relevance screening tool

No.	Question	Reason for exclusion
1	Does the article have abstracts?	"No abstract"
2	Does the article describe research in English?	"Foreign language"
3	Is the article published between 2012 and 2022?	"Wrong publication year"
4	Does the article *mention* any Women of Reproductive age?	"Wrong population"
5	Does the article *mention* any Burden (Prevalence/Incidence, Mortality, and Risk Factors) of Sexually transmitted Infection/Sexually transmitted disease?	"Wrong concept"
6	Does the article *mention* any Sub-Saharan Africa?	"Wrong context" if countries other than Sub-Saharan Africa mentioned

Reviewer decision:

- If the reviewer answered "yes" to all questions, the article was marked as "included"
- If the reviewer answer is "no" for at least one of the questions, the article was marked as "excluded" and the reason for exclusion(s) was added

Annex 3: Full-text article relevance screening tool

General Information

Title:	
First author:	Year of publication:
Citation:	

Study Eligibility

Study Characteristics			**Reason for exclusion**
Language	*Is it published in English?* ☐ Yes ☐ No □ **Exclude**		Foreign language
Publication type	☐ Peer-reviewed population-based research articles ☐ Other (specify e.g. book chapter, case report, commentaries) _____	*Does the publication type meet the criteria for inclusion?* ☐ Yes ☐ No □ **Exclude**	Wrong publication type
Study design	☐ Content analysis ☐ Cross-sectional survey research ☐ Review article ☐ Hypothetical study ☐ Other design (specify) _____	*Does the study design meet the criteria for inclusion?* ☐ Yes ☐ No □ **Exclude**	Wrong study design

Study Characteristics			Reason for exclusion
Country of study	Any countries classified as LMIC by the World Bank? ☐ Yes ☐ No □ **Exclude**		Wrong context
	Specific location:		
Type of disease	☐ Swine flu ☐ COVID-19 ☐ Other respiratory disease outbreak	*Does the disease being studied meet the criteria for inclusion?* ☐ Yes ☐ No □ **Exclude**	Wrong concept
Sex and age group of the population involved	Describe the Sex and age group involved in the study (e.g. Women of reproductive age):		Wrong population
	Describe the participants included:		
	Does the age group and sex meet the criteria for inclusion? ☐ Yes ☐ No □ **Exclude**		
Measured outcome	List of outcomes:		Wrong concept
	Do the outcome measures meet the criteria for inclusion? ☐ Yes ☐ No □ **Exclude**		
Level of outcome	*Is this study conducted in Sub-Saharan Africa Region?* ☐ Yes ☐ No □ **Exclude**		Wrong context

Summary of Assessment for Inclusion

Reviewer decision

(1) If the reviewer answer "yes" to all questions, the article was marked as "included" (2) If the reviewer answer is "no" for at least one of the questions, the article was marked as "excluded" and reason for exclusion(s) was added
Include in review ☐11 **Exclude from review ☐ 747**
Notes: This was done after going through the three databases (EMBASE, Africa Journals Online, and PubMed) and running the article through RAYYAN.